Product Preview

SMARTMOS®

1 Channel H-Bridge Driver IC

MPC17511

MPC17511 is a monolithic type SMOS5AP SMARTMOS IC built in 1channel H-Bridge Driver constituted LDMOSFET, input section can be directly interfaced from the MCU.

This IC can control 4 mode output function (Forward, Reverse, Brake, Open) by input logic.

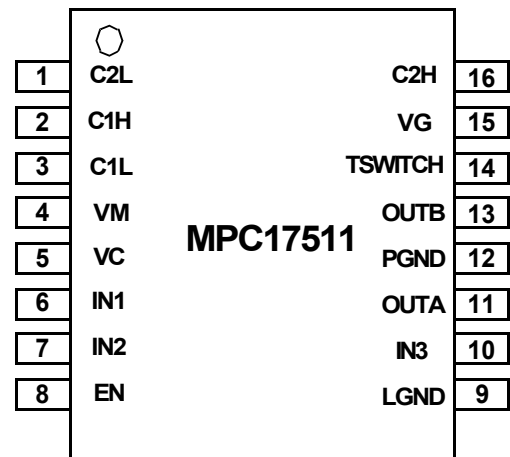
This IC can drive various type of micro motor and low loss.

16PIN SVM

Features

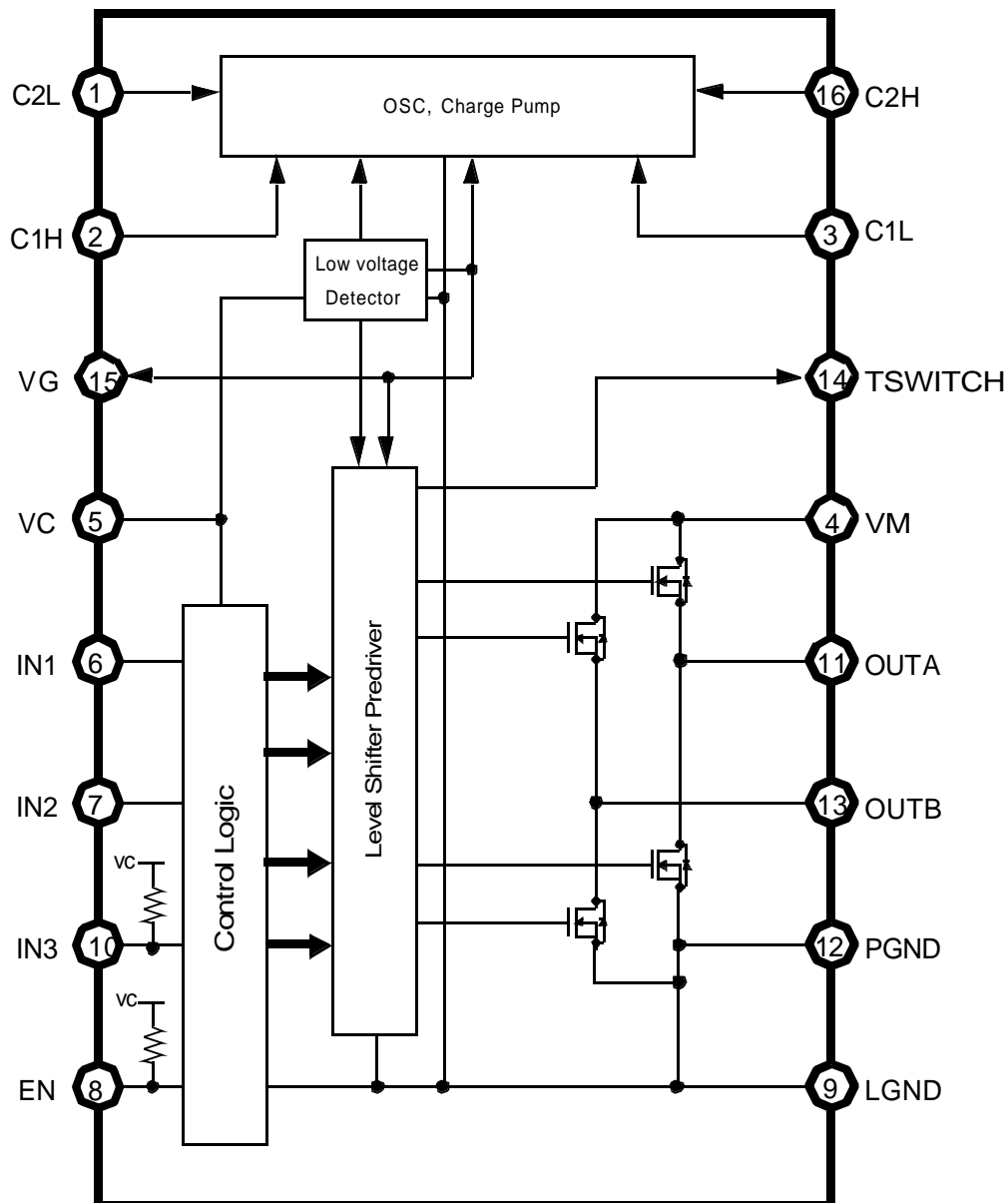
- Manufactured by SMOS5AP process technology
- Built in 1 Channel Circuit of H-Bridge Driver
- Built in Charge-pump Circuit
- 4 Mode Drive(Forward, Reverse, Brake, Open)
- Direct Interface from the MCU
- Low ON-Resistance Ron=0.6 ohm(Max.)
- IDR=1.0A (Cont.)
- Low Consumption Power
- Built in Shoot Through Current Prevention Circuit
- Built in Low Voltage Shutdown Circuit
- PWM Control frequency 200kHz(Max.)
- Comes in 16-pin VMFP
  (pin pitch : 0.65mm)

Pin Connections

Pin	Name		Name	Pin
1	C2L	MPC17511	C2H	16
2	C1H		VG	15
3	C1L		TSWITCH	14
4	VM		OUTB	13
5	VC		PGND	12
6	IN1		OUTA	11
7	IN2		IN3	10
8	EN		LGND	9

(Top View)

*SMARTMOS is a registered trademark of Motorola Inc.

*Specifications in this data sheet may be changed without prior notice.

Block Diagram

*Each GND pin are connected by Metal.

Function Table

Z : High impedance X : Don't care

EN	IN1	IN2	IN3	OUTA	OUTB	TSWITCH
H	H	H	X	L	L	X
H	H	L	X	H	L	X
H	L	H	X	L	H	X
H	L	L	X	Z	Z	X
L	X	X	X	L	L	L
H	X	X	H	X	X	L
H	X	X	L	X	X	H

Maximum Ratings *1

Rating	Symbol	Min.	Max.	Unit
Driver Circuit Power Supply Voltage	VM	- 0.5	8.0	V
Pre-Driver Circuit Power Supply Voltage	VG	- 0.5	14.0	V
Control Circuit Power Supply Voltage	VC	- 0.5	7.0	V
Singnal Input Voltage	VIN	- 0.5	VC+0.5	V
Driver Output Current (continuous)	IDR	---	1.0	A
Driver Output Current (pulsed) *2	IDRp	---	3.0	A
Operating Junction Temperature	Tj	- 55	150	degC
Storage Temperature Range	Tstg	---	150	degC
Thermal Resistance *3	Rθja	150		deg./W
Power Dissipation *4	PD	---	830	mW

*1) Device may be damaged when used over the ratings.
*2) Ta=25C, Peak time is within 10ms at intervals 0.2seconds.
*3) 37 X 50 X 1.6[mm] glass EPOXY Board mount.
*4) Ta=25C

Recommended Operating Condition

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Driver Circuit Power Supply Voltage	VM	2.0	5.0	6.8	V
Control Circuit Power Supply Voltage	VC	2.7	5.0	5.7	V
Signal Input Voltage	VIN	0	---	VC	V
Pulse Input Frequency	FIN	---	---	200	kHz
Input Pulse Rise Time	TR	---	---	1.0	us
Input Pulse Fall Time	TF	---	---	1.0	us
Operating Ambient Temperature	Topr	-20	25	65	°C
Capacitor for Charge Pump	C1,C2,C3	0.01	0.1	1.0	uF
Pre-Driver Circuit Power Supply Voltage	VG	12	13	13.5	V

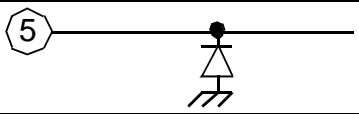
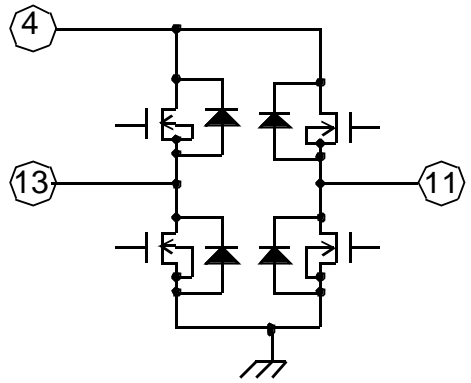
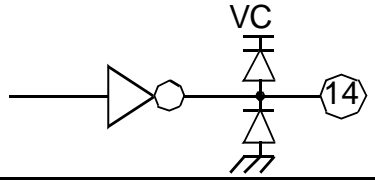
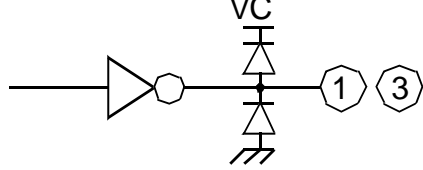
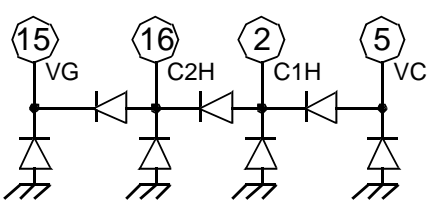
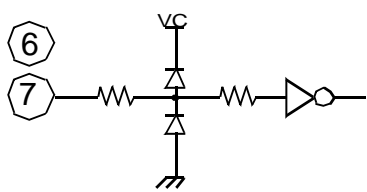
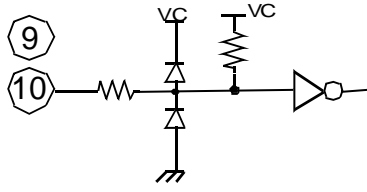
DC CHARACTERISTICS (Ta=25C, VC=VM=5.0V, GND=0V)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Test circuit	
Quiescent Power Supply Current							
Driver Circuit Power Supply Current	IMO	---	---	1.0	uA	A	*1
Control Circuit Power Supply Current	ICO	---	---	1.0	mA		
Active Power Supply Current							
Control Circuit Power Supply Current	IC	---	---	3.0	mA	G	*2
Pre-Driver Circuit Power Supply Current	IG	---	---	0.7	mA		
Logic Input Function							
High Level Input Voltage	VIH	VCx0.7	---	---	V	B	*3
Low Level Input Voltage	VIL	---	---	VCx0.3	V		
High Level Input Current	IIH	---	---	1.0	uA		
Low Level Input Current	IIL	- 1.0	---	---	uA		
Driver Output ON Resistance	RON	---	0.46	0.60	ohm	D	*4
Pullup Resistance (EN,IN3)	Rup	50	100	200	kohm		
Charge-pump Output Voltage	VG	12	12.8	13	V	C	*5
Charge-pump Output Voltage (IG=-1mA)	VGload	10	11.2	---	V	E	
Low Voltage Detection Circuit Detection Voltage	VCDET	1.5	2.0	2.5	V	F	*6
TSWITCH OUT IOUT=-50uA	VOH	VG-0.5	VG-0.1	VG	V	B	
IIN=50uA	VOL	LGND	LGND+0.1	LGND+0.5	V		

*1) ICO includes current to the pre-driver circuit.
*2) IC includes current to the pre-driver circuit. IC:Fin100kHz. IG:Fin20kHz.
*3) 2.7V < VC < 5.7V *4) IDR=1.0[A] source+sink *5) When no input logic signal.
*6) Detection voltage is defined output become High-impedance when VC voltage is dropped.
When the gate voltage VG is applied from an external source, VG=7.5[V]

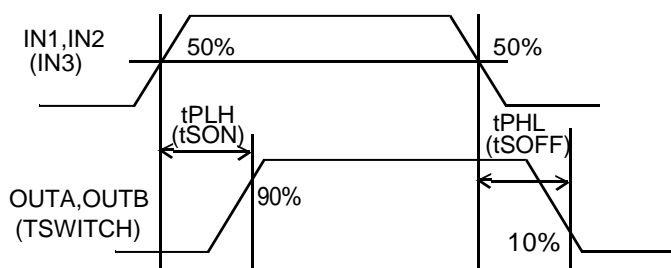
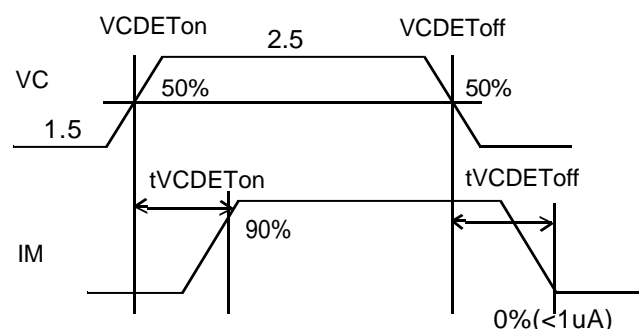
AC CHARACTERISTICS (Ta=25C, VC=VM=5.0V, GND=0V)

Characteristics		Symbol	Min.	Typ.	Max.	Unit	Test circuit	
Output Propagation Delay Time	Turn-ON time	tPLH	---	0.1	0.5	us	D	
	Turn-Off time	tPHL	---	0.1	0.5	us		
TSWITCH Propagation Delay Time	Turn-ON time	tSON	---	0.15	0.5	us	C2	
	Turn-Off time	tSOFF	---	0.15	0.5	us		
Charge-pump Circuit	Rise time	tVGON	---	1.0	3.0	ms	C	*1
Low Voltage Detection Circuit	Detection time	tVCDET	---	---	10	ms	F	

*1) When C1=C2=C3=0.1[uF]

tPLH,tPHL (tSON,tSOFF)Timing Chart

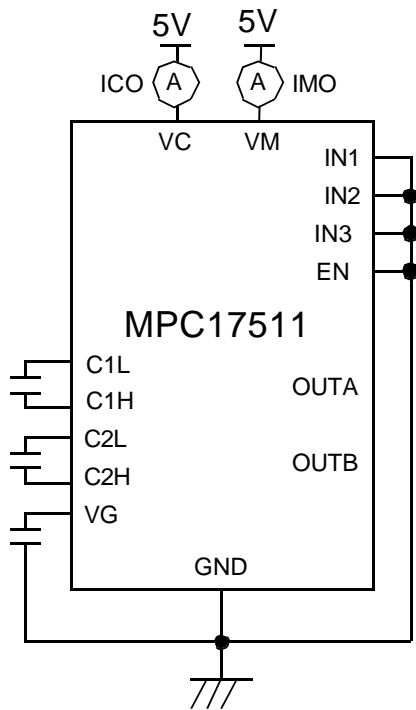
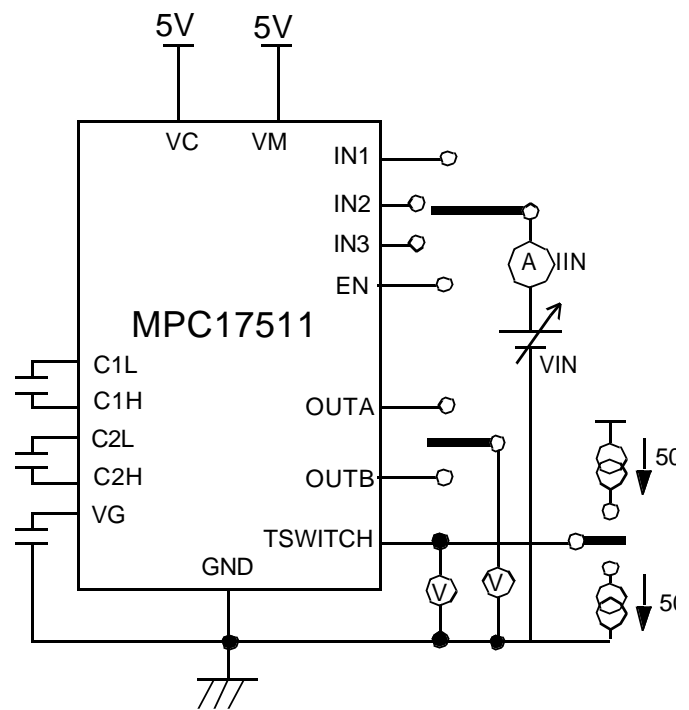
IN1,IN2 (IN3)
50%
50%
tPLH (tSON)
tPHL (tSOFF)
OUTA,OUTB (TSWITCH)
90%
10%

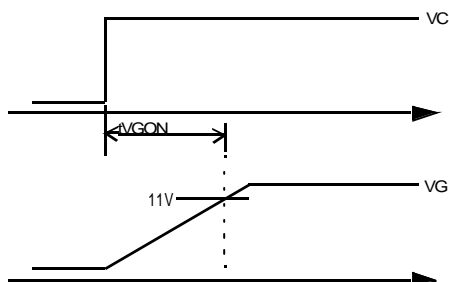
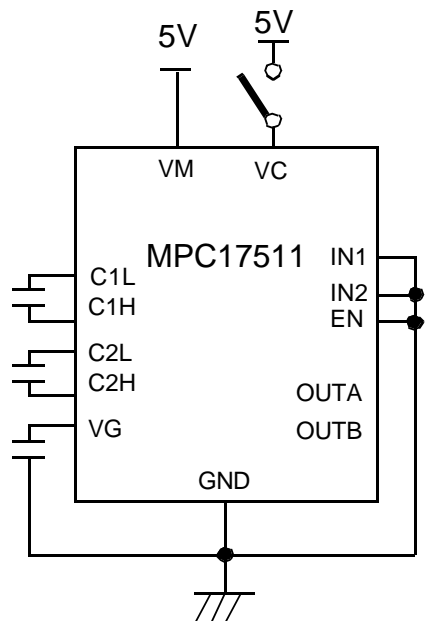
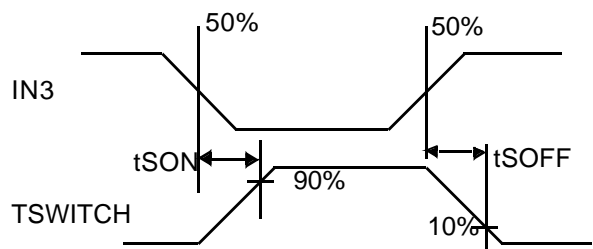
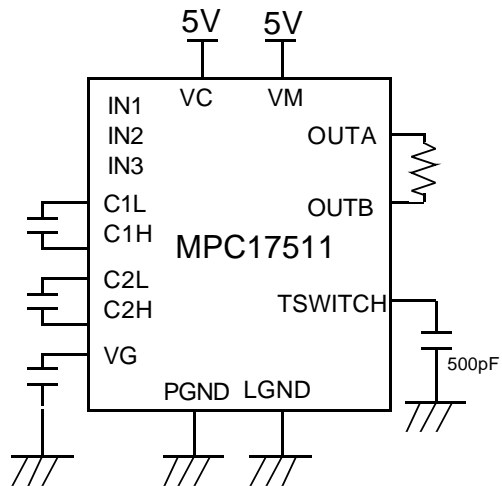
tVCDET Timing Chart

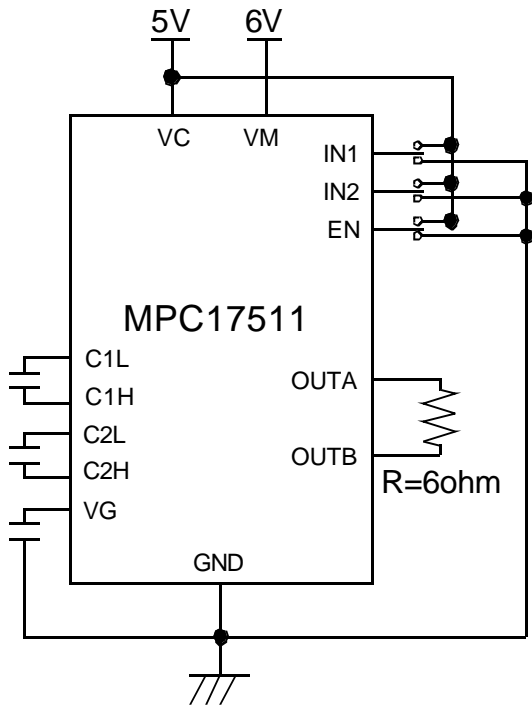
VCDETon
2.5
VCDEToff
VC
50%
50%
1.5
tVCDETon
tVCDEToff
IM
90%
0%(<1uA)

Pin Description

Symbol	PIN No.	Simplified Circuit Schematic	Function
VC	5		Control Circuit Power Supply Pin
VM	4		Driver Power Supply Voltage Input Pin
OUTA	11		Driver Output Pin
OUTB	13		Driver Output Pin
TSWITCH	14		Output pin of stepÅ|up voltage
C1L	3		These pins connect to charge pump capacitors. (Negative pole)
C2L	1		
C1H	2		These pins connect to charge pump capacitors. (Positive pole)
C2H	16		
VG	15		Pre-Driver Circuit Power Supply Pin
IN1	6		Control Signal Input Pin 1
IN2	7		Control Signal Input Pin 2
EN	8		Enable Control Signal Input Pin
IN3	10		Control Signal Signal Input Pin 3 for TSWITCH
LGND	9	Logic GND Pin	
PGND	12	Driver GND Pin	

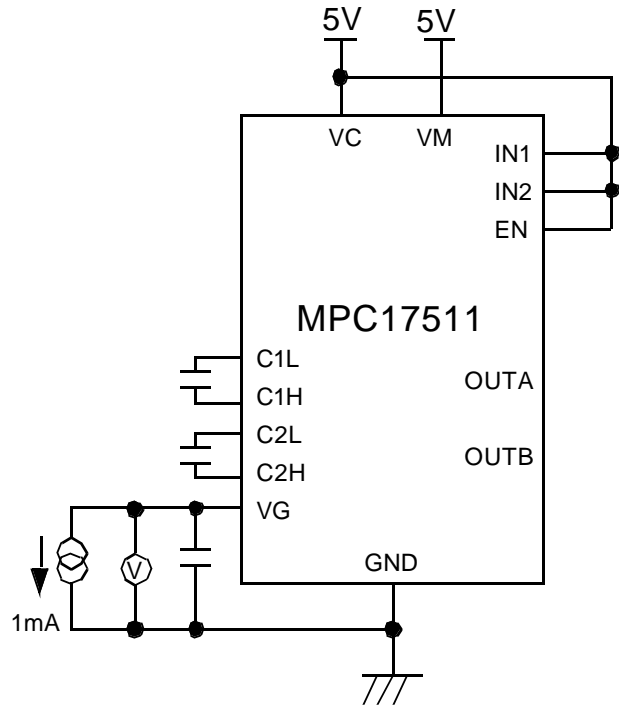
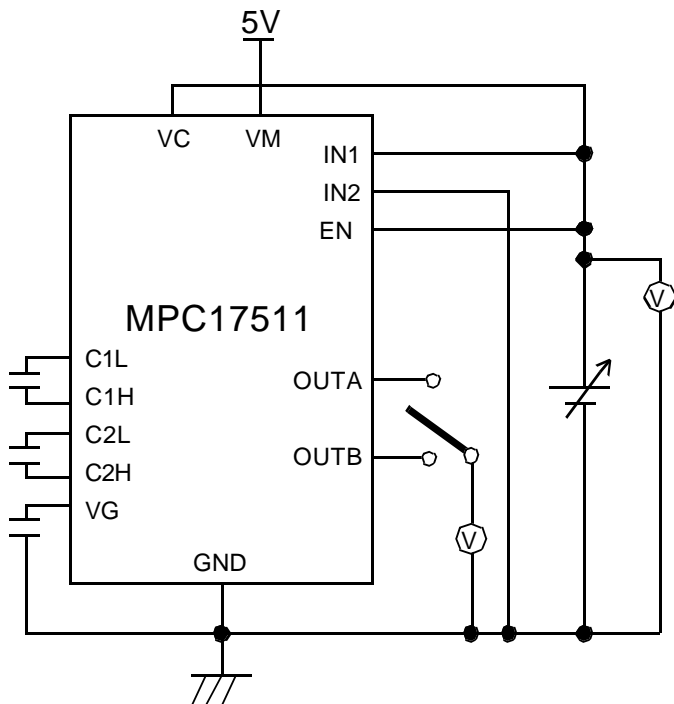
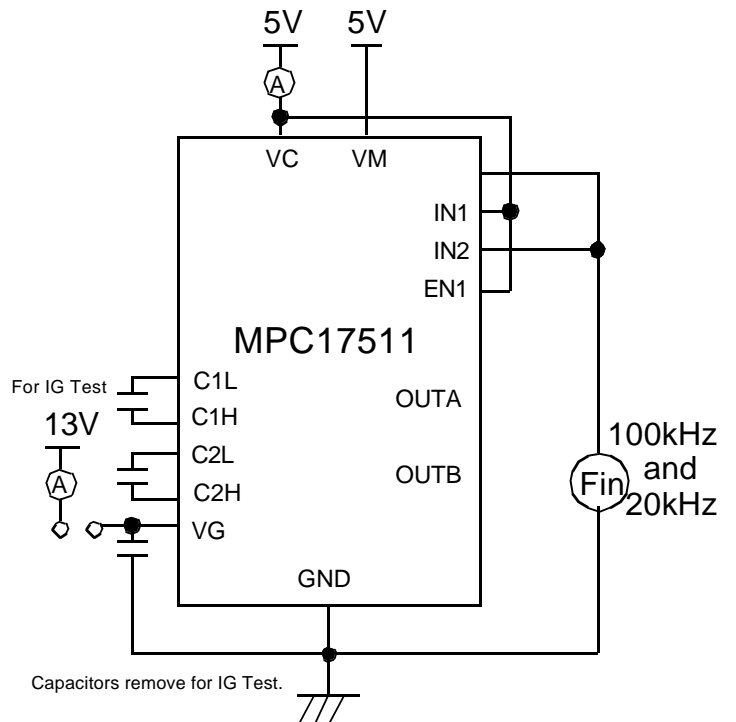
Test Circuit

Capacitor for charge pump (C1,C2.C3)= 0.1[uF]

Test Circuit A

Test Circuit B

Test Circuit C

Test Circuit C2

Capacitor for charge pump (C1,C2.C3)= 0.1[uF]

Test Circuit D

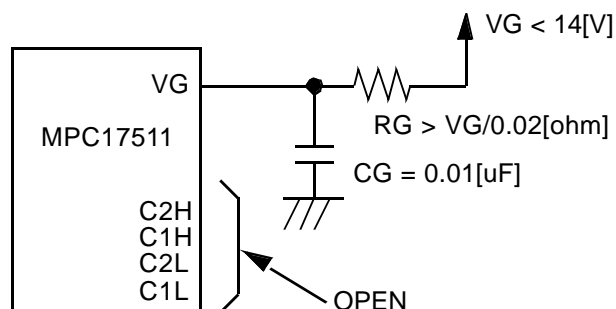
Test Circuit E

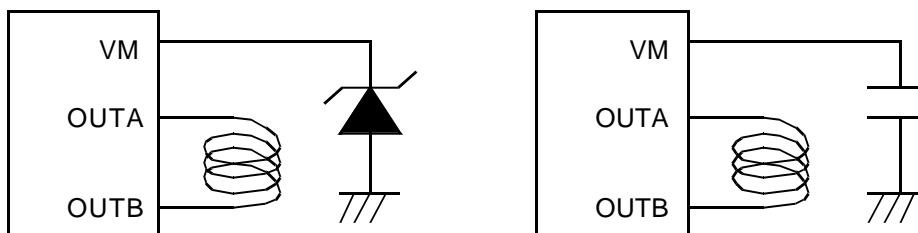
Capacitors remove for IG Test.

Test Circuit F

Test Circuit G

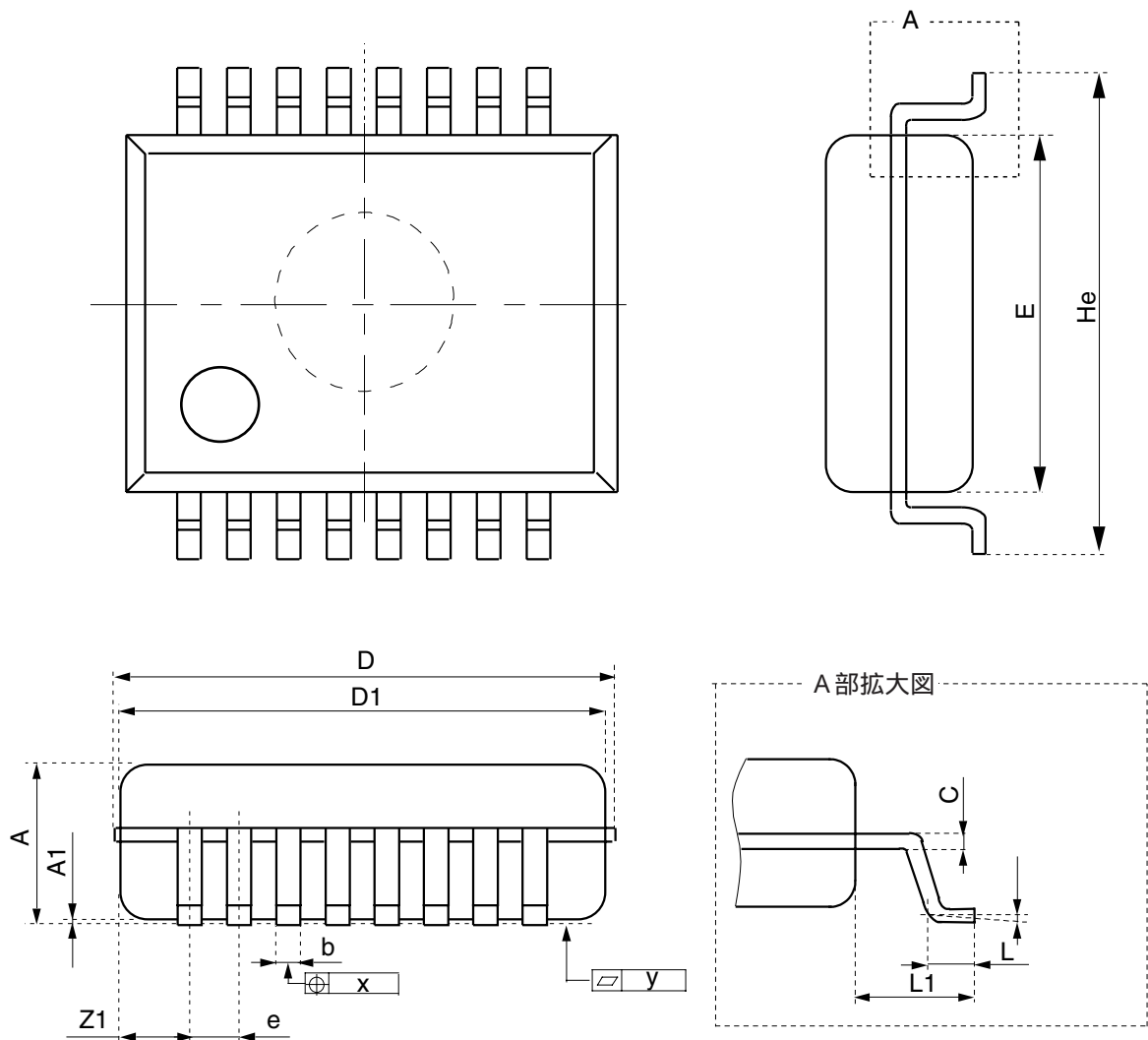
Precautions on Application

(1)When applying the gate voltage VG from an external source, be sure to connect it via a resistor equal to or greater than RG=VG/0.02[ohm]. However, this resistance is unnecessary if you are connecting a charge pump output from a SMARTMOS product.

VG < 14[V]
VG
MPC17511
RG > VG/0.02[ohm]
CG = 0.01[uF]
C2H
C1H
C2L
C1L
OPEN

(2)Switching from the state of active current loading to high-impedance mode, indactance load and P.C.B. layout may induce over maximum ratings to a power supply pin. Zener diode or capacitor at VM pin will protect kick back voltage(it depends on the indactance load). The schottky diode at output pin will also protect it.

VM
OUTA
OUTB
VM
OUTA
OUTB

(3)Connect a capacitor of sufficient capacitance between the power supply and ground pins. For all large-current paths, use sufficiently wide copper conductor patterns and route them in the shortest distance possible.

(4)When using SMARTMOS products in your circuit design, make sure they are fully protected against static charge.

■ 16 ピン SVMFP 外形寸法図

	SPEC		
	MIN	TYP	MAX
A	*****	1.95	2.05
A1	0.10	0.15	0.20
b	0.25	0.30	0.35
C	0.18	0.20	0.25
D	*****	5.45 MAX	
D1	5.20	5.25	5.30
e	0.60	0.65	0.70
E	5.25	5.30	5.35
He	7.70	7.90	8.10
L	0.45	0.60	0.75
L1	1.20	1.30	1.40
x	*****	*****	0.12
y		0.05	
Z1	0.25	0.35	0.47
θ	0.0 °	4.0 °	9.8 °